State Tobacco Control Spending and Youth Smoking

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Significant resources are currently being devoted to programs aimed at reducing tobacco use and the damage it causes to the public. Comprehensive programs have been developed to prevent the initiation of tobacco use among young people, promote cessation of tobacco use among adults and young people, eliminate exposure to environmental tobacco smoke, and identify and eliminate disparities among population groups in order to reduce the disease, disability, and death that result from tobacco use.[1,2] Successful programs have included the following key components: community interventions and programs, countermarketing, program policy and regulation, and surveillance and evaluation.[2,3]

Many of these programs are funded by state cigarette excise tax revenues earmarked for tobacco control programs that come from either voter initiatives or state-legislated increases in cigarette and other tobacco product taxes; others are supported from general revenues. The first major comprehensive state programs resulted from ballot initiatives that increased state cigarette and other tobacco product taxes and earmarked some of the new revenues generated by the tax increases for tobacco control. California led the way in 1988 when voters passed Proposition 99, which raised the cigarette tax by 25 cents per pack. California used funds from the tax increase to support antitobacco initiatives, including a media campaign, community education programs, school education programs, research funding, surveillance and evaluation activities, and other initiatives. Massachusetts was next in 1992 when voters passed the Question 1 referendum, which raised the cigarette tax by 25 cents per pack. Revenues from tobacco taxes in Massachusetts were used to fund a large antismoking media campaign, school and community antismoking education programs, increased enforcement of local tobacco ordinances, and various other initiatives. Several states followed the lead of California and Massachusetts by using ballot initiatives to raise tobacco taxes and fund comprehensive programs. Other states legislated for an earmarked excise tax–funded program. Most recently, in November 2001, voters in the state of Washington overwhelmingly adopted a 60-cent increase in the state cigarette excise tax, with a significant portion of the new revenues earmarked for a comprehensive state program.

Other state tobacco control programs are funded by state settlements with cigarette manufacturers or by the funds states receive through the Master Settlement Agreement with the tobacco industry. In 2002, the 4 states that settled individually—Mississippi, Texas, Florida, and Minnesota—spent a portion of their settlement funds on state tobacco control programs.[1] Similarly, 38 of the states that were a part of the Master Settlement Agreement have set aside some of their settlement funds for a tobacco control program.[1] (Settlement funding for tobacco control in Arizona and Massachusetts was not included in these calculations because their state budgets had not been finalized at the time the Centers for Disease Control and Prevention [CDC] released its report.)

Federal and private funding for national programs also have supported state efforts to reduce tobacco use. The first major effort was the American Stop Smoking Intervention Study (ASSIST) program, a partnership between the National Cancer Institute and the American Cancer Society that supported state-based coalitions focused on changing tobacco control policies in 17 states from 1991 through 1998. During this same period, the CDC funded the remaining states (excluding California) and the District of Columbia under its Initiatives to Mobilize for the Prevention and Control of Tobacco Use (IMPACT) program. In 1999, these 2 programs were replaced by the CDC-funded National Tobacco Control Program that supports tobacco control efforts in all 50 states, the District of Columbia, and 7 territories.[2] Since 1994, the Robert Wood Johnson Foundation's SmokeLess States program has also funded tobacco control coalitions in 42 states. This program, which is administered by the American Medical Association, emphasizes strengthening state tobacco control policies.

Overall, the CDC estimated that state investment in tobacco control efforts was $861.9 million, or $3.16 per capita, in fiscal year 2002.[1] Although considerably higher than it was even a few years ago, the invest-

Objective. We examined the relationship between state-level tobacco control expenditures and youth smoking prevalence and cigarette consumption.

Methods. We estimated a 2-part model of cigarette demand using data from the 1991 through 2000 nationally representative surveys of 8th-, 10th-, and 12th-grade students as part of the Monitoring the Future project.

Results. We found that real per capita expenditures on tobacco control had a negative and significant impact on youth smoking prevalence and on the average number of cigarettes smoked by smokers.

Conclusions. Had states represented by the Monitoring the Future sample and the District of Columbia spent the minimum amount of money recommended by the Centers for Disease Control and Prevention, the prevalence of smoking among youths would have been between 3.3% and 13.5% lower than the rate we observed over this period. (*Am J Public Health.* 2005;95:338–344. doi: 10.2105/AJPH.2004.039727)

ment in most states is well below the level the CDC recommends as the minimum needed to support a comprehensive tobacco control program.[1,3] In its initial *Best Practices* guidelines released in 1999, the CDC recommended a minimum average per capita spending of $5.98 for the United States, with the state levels ranging from a low of $5.12 in California to a high of $15.39 in Wyoming.[3] On average, the CDC upper estimate was nearly 3 times as high, at $15.85 per capita for the United States. The CDC funding recommendations for each state depended on state-specific characteristics, such as demographic factors, tobacco use prevalence, and other factors. As of 2002, funding in 18 states was one third that of the minimum recommended by the CDC or lower; only 6 states had reached the minimum level of funding.[4] (Settlement funding for tobacco control in Arizona and Massachusetts were not included in these calculations because their state budgets had not been finalized at the time the CDC released its report.)

By comparison, total marketing expenditures for the 5 major US cigarette companies in 2001 (the latest year available) were $11.2 billion, more than 13 times the total investment in state tobacco control efforts.[5] The 2001 marketing expenditures were a record high for these companies and represented a 66.6% increase from spending in 1998.

Evaluations of major individual state programs provide compelling evidence that these programs are correlated with reduced tobacco use.[2,6,7] In California, for example, per capita cigarette sales were cut almost in half from 1988 to 1999, whereas the decline was only about 20% in the rest of the Unites States. The prevalence of youth smoking in California fell by 43% from 1995 to 1999.[8,9] The health benefits of the reductions in tobacco use in California are beginning to appear. Recent estimates indicate that the rate of death caused by heart disease and lung cancer has fallen sharply.[10,11] After adopting a large-scale comprehensive state tobacco control program, Massachusetts,[12–15] Oregon,[16] Arizona,[17] and Florida[18,19] observed large reductions in smoking.

However, in contrast to the growing number of state-specific reports, little evidence exists from national-level analyses of the impact of investments in tobacco control. An early analysis that compared per capita cigarette sales in ASSIST states to sales in non-ASSIST states found that sales declined 28% faster in the ASSIST states in the first several years after the program began, whereas in the years before the program, trends in sales between the 2 groups were similar. This finding suggests that the investment in ASSIST reduced smoking.[20] More recently, a multivariate analysis relating state-level per capita expenditures on all major tobacco control programs (tax and settlement funded, ASSIST, IMPACT, and SmokeLess States) to state-level per capita cigarette sales for the period from 1981 through 2000 concluded that investments in tobacco control programs have reduced aggregate cigarette consumption.[21]

To date, only 1 analysis has used national data to study the impact of these programs on youth smoking. Using data from the 1991, 1993, 1995, 1997, and 1999 Youth Risk Behavior Surveys, Farrelly and colleagues[22] found little evidence that increased spending on state tobacco control efforts reduced the prevalence of smoking among youths. However, they did provide some evidence that greater spending was associated with a reduction in the average number of cigarettes smoked among young smokers. However, as the authors noted, this study was limited by the exclusion of several states with comprehensive programs in place during the period covered by their analyses (including Massachusetts, Arizona, and Oregon), because of the lack of consistent data from the Youth Risk Behavior Surveys for these states over this period.

Although much is known about the impact of some individual state programs on cigarette smoking within the state, very few studies have looked at the impact of state programs on cigarette smoking at the national level. Our study adds to the growing body of evidence on the impact of state tobacco control programs on smoking by examining the relationship between state-level per capita tobacco control expenditures and youth smoking prevalence and consumption

using data taken from the nationally representative Monitoring the Future (MTF) surveys of 8th-, 10th-, and 12th-grade students, matched with information on tobacco control spending, cigarette prices, and measures of state tobacco control policies. As such, it provides the best assessment to date on the impact of these programs on youth smoking. The findings from this research should be particularly important for state policymakers debating the use of the Master Settlement Agreement and other funds for state tobacco control programs.

METHODS

Survey Data

The data for this study were extracted from the 1991 through 2000 surveys of 8th-, 10th-, and 12th-grade students conducted by the Institute for Social Research at the University of Michigan as part of the MTF project.[23] The MTF project has conducted nationally representative surveys of 15 000 to 19 000 high school seniors each year since 1975 and similar numbers of 8th- and 10th-grade students since 1991. These surveys focus on the use of alcohol, tobacco, and illicit drugs among youths and young adults and related attitudes and beliefs. Given the nature of the data being collected, extensive efforts are made by the MTF project to ensure that the data collected are accurate and informative. For example, students are assured of confidentiality, and all questionnaires are administered by trained University of Michigan interviewers. Descriptive statistics of the variables are shown in Table 1.

Data on each individual's monthly cigarette use were used to construct 2 alternative dependent variables: prevalence of cigarette smoking and average monthly cigarette consumption among smokers. Prevalence of cigarette use was a dichotomous indicator equal to 1 for youths who indicated that they smoked cigarettes in the 30 days before the survey; otherwise, a value of 0 was assigned. The second dependent variable was a quasi-continuous measure of monthly cigarette consumption among smokers. This variable was based on a question that asked respondents how fre-

TABLE 1—Descriptive Statistics of 8th-, 10th-, and 12th-Grade Students Surveyed From 1991 Through 2000 for the Monitoring the Future Project

Variable	Mean (SD)
Age, y	15.4951 (1.7588)
Age squared, y	243.1929 (54.8835)
Male	0.4863 (0.4998)
Race/ethnicity	
African American	0.1249 (0.3306)
Hispanic	0.1010 (0.3013)
Asian American	0.0320 (0.1759)
Native American	0.0199 (0.1397)
Other race	0.0482 (0.2142)
Parents' education	
Father has less than high school education	0.1265 (0.3324)
Father has at least some college	0.4977 (0.5000)
Mother has less than high school education	0.1211 (0.3263)
Mother has at least some college	0.5179 (0.4997)
Real earned income, $ per wk	19.5628 (26.7354)
Real income other sources, $ per wk	9.7046 (15.0295)
Grade 8	0.3691 (0.4826)
Grade 10	0.3195 (0.4663)
Year surveyed	
1991	0.0996 (0.2994)
1992	0.1027 (0.3036)
1993	0.1041 (0.3054)
1994	0.1017 (0.3022)
1995	0.1043 (0.3057)
1996	0.1001 (0.3002)
1997	0.1031 (0.3041)
1998	0.1012 (0.3017)
1999	0.0918 (0.2887)
Real per capita tobacco control expenditures, $ per y	0.4826 (1.17)
Real price of cigarettes, cents per pack	133.7460 (27.0426)
Clean indoor air index	14.5393 (10.8701)
Youth access index	12.3708 (7.1315)
Purchase use possession index	1.0790 (1.0318)
Tobacco-producing state	0.1294 (0.3357)
Region of the United States	
New England	0.0524 (0.2228)
East North Central	0.1842 (0.3877)
West North Central	0.0784 (0.2688)
South Atlantic	0.1655 (0.3717)
East South Central	0.0669 (0.2498)
West South Central	0.1203 (0.3254)
Mountain	0.0596 (0.2368)

quently they smoked during the previous 30 days. Response alternatives and their coded values in parentheses were less than 1 cigarette per day (.5), 1 to 4 cigarettes per day (3), about a half pack per day (10), about 1 pack per day (20), about 1 and a half packs per day (30), and 2 packs or more per day (40).

Variables that were used to control for other factors thought likely to affect cigarette demand included the following: age of the respondent in years, age of the respondent in years squared, gender (male and female [reference category]), average earned weekly income in 1982–1984 dollars, average income from other sources in 1982–1984 dollars, separate indicators for year of the survey, (2000 as the reference category), separate indicators for school grade (12th grade as the reference category), indicators of race/ethnicity (Black, Hispanic, Asian, Native American, other race, and White [reference category]), and indicators of parental education for mother and father separately (less than high school graduate, at least some college, and high school graduate [reference category]).

Tobacco Control Expenditures

Using state identifiers, yearly inflation-adjusted per capita expenditures on tobacco control were merged with the survey data. This variable was created by combining real per capita state-specific excise tax funding and other state appropriated funds earmarked for tobacco control programs with real per capita nongovernmental state-level expenditures and per capita tobacco control expenditures from ASSIST, IMPACT, SmokeLess States, and the National Tobacco Control Program. Unfortunately, no information was available on what types of tobacco control interventions each program used and how much was spent on each intervention. Thus, the overall state per capita tobacco control expenditure variable reflects total resources allocated toward tobacco control in each state each year.

Cigarette Prices

Based on the state in which each youth's school was located, we also merged cigarette prices with the survey data. We ob-

tained price data from the annual Tax Burden on Tobacco. Until 1999, the Tobacco Institute published state-level cigarette prices as of November 1. Since then, Orzechowski and Walker have published the data.[24] These prices are weighted averages for a pack of 20 cigarettes and are inclusive of state-level excise taxes applied to cigarettes but are exclusive of local cigarette taxes. Because the price published was as of November 1 and the surveys were conducted between February and June of each year, we created a weighted average price for the first 6 months of each year. To account for changes in the relative price of cigarettes over time, all cigarette prices were deflated by the national Consumer Price Index published by the Bureau of Labor Statistics (1982–1984 = 100).[25]

Clean Indoor Air Laws

Using state identifiers, we merged a clean indoor air index variable with the survey data. (The clean indoor air data were compiled by Gary Giovino and colleagues at the Roswell Park Cancer Institute for project ImpacTeen. The data and code book describing the data can be accessed at http://www.impacteen.org/tobaccodata.htm.) Nine separate restrictions constituted the index variable, including restrictions on smoking in private work sites, restaurants, recreational facilities, shopping malls, health facilities, public transit facilities, cultural facilities, public schools, and private schools. Each of these restrictions took on a value of between 0 and 5, depending on the strength of the regulation. The index was derived by summing the restriction ratings for each of the 9 restrictions, giving a weight of 2 for the restaurant, recreational facilities, cultural facilities, shopping mall, private school, and public school restrictions and a weight of 1 for the remainder of the restrictions.

Youth Access Laws

Based on state identifiers, we merged a youth access index with the survey data. This index was based on the measure developed by Alciati and associates[26] for the National Cancer Institute. The index captures the extensiveness and comprehensiveness of

state policies aimed at reducing youth access to tobacco products. Nine separate restrictions constituted the youth access index variable, including minimum age of purchase, packaging, clerk intervention, photographic identification, vending machine availability, free distribution of samples, graduated penalties, random inspections, and statewide enforcement. Each of these restrictions took on a value of either 0 to 4 or 0 to 5, depending on the strength of the regulation. The youth access index is derived by summing the restriction ratings for each of the 9 restrictions.

Purchase, Use, and Possession Laws

Finally, we created an index intended to capture the overall magnitude of state-level cigarette purchase, use, and possession laws. The index was composed of a tally of 3 dichotomous indicators that represented whether or not each state had a cigarette purchase, use, and possession law in effect when the surveys were administered.

Statistical Methods

We used a model developed by Cragg[28] to estimate a 2-part model of cigarette demand. In the first step, we used the probit methods to estimate a cigarette smoking prevalence equation. In the second step, we used the ordinary least squares methods to estimate average daily cigarette smoking by smokers, where the dependent variable is the natural logarithm of the continuous monthly consumption measure. Both equations used weights to account for differential sampling probabilities. The same set of independent variables was included in both equations.

We estimated 3 alternative models for both smoking prevalence and smoking consumption among smokers. The first model for each dependent variable contained estimates from a model specification that includes real per capita tobacco control expenditures, real price of cigarettes, clean indoor air index, youth access index, purchase use and possession index, age, age squared, gender, race, parental education, real earned income, real income from other sources, dichotomous indicators for each year in the sample minus 1, dichotomous indicators for each grade level minus 1, and a

dichotomous indicator for whether or not the respondent resides in a tobacco-producing state (i.e., Kentucky, North Carolina, Georgia, South Carolina, Tennessee, and Virginia). We also included dichotomous indicators for respondents with missing data for race, parental education, and income. (These missing value indicators were created to prevent the loss of a large number of observations. For example, if the mother's education was unknown, each of the mother's education variables was assigned a value of 0, whereas an additional indicator, mother's education unknown, was assigned a value of 1. This missing value indicator was assigned a value of 0 for all respondents whose mother's education was known.)

The second and third models estimated for each dependent variable were identical to the first model, except the second and third models replaced the tobacco-producing indicator with census division indicators and state indicators, respectively. The inclusion of a tobacco-producing indicator, census division indicators, and state indicators are 3 alternative ways to control for the possibility that unobserved sentiment toward smoking was causing both stronger (weaker) antitobacco policies and decreased (increased) youth smoking. Whereas the models that use either a tobacco-producing indicator or census division indicators may not fully capture state sentiment toward tobacco and may overestimate the true impact of tobacco control expenditures on youth smoking, the models that use state indicators may underestimate the true impact of tobacco control expenditures on youth smoking because these models limit the variation in tobacco control expenditures to within-state variation in expenditures over time.

RESULTS

After controlling for the other potential determinants of youth cigarette demand described earlier, we found that real per capita tobacco control expenditures have a negative and statistically significant relationship with smoking prevalence and the amount smoked by smokers. This relationship was

found in all of the models that were estimated. (The estimates for smoking prevalence equations and cigarette consumption equations can be found in Tables 2 and 3, respectively.) These estimates indicate that higher per capita tobacco control expenditures are associated with lower youth smoking prevalence and lower daily cigarette consumption.

Because the probit models that were used to estimate the smoking prevalence equations are nonlinear in nature, the estimated parameters do not directly provide meaningful information for understanding the exact relationship between tobacco control expenditures and smoking prevalence. Therefore, the estimates were used to perform simulations that predict smoking prevalence rates under alternative assumptions about the level of tobacco control program funding. Table 4 provides predicted probabilities of smoking prevalence when tobacco control expenditures were set to the following: 0, mean of sample, CDC state-specific minimum recommended expenditure, and CDC state-specific maximum recommended expenditure, holding all other independent variables at their mean. Table 4 also includes percentage point and percentage changes in the predicted probabilities when expenditures were varied from either no funding or mean funding to all the higher echelons of funding.

Holding all covariates at their mean, the average predicted smoking prevalence across the 3 alternative models is 24.23. If states would have spent the CDC-recommended amount of money on tobacco control during each of the years analyzed, smoking prevalence among 8th, 10th, and 12th graders would have been significantly lower than what was observed. For example, if states would have spent exactly the CDC's minimum recommended funding per capita, the estimates imply that youth smoking prevalence would have been between 3.3% and 13.5% lower than what was observed over this period. Moreover, the estimates imply that had states not spent any money on tobacco control, smoking prevalence among 8th, 10th, and 12th graders would have been between 0.45% and 2.02% higher than what was observed over this period.

TABLE 2—Smoking Prevalence Equations

Independent Variables	Model 1	Model 2	Model 3
Real per capita tobacco control expenditures, $ per y	−0.0321 (−14.33)	−0.0345 (−13.65)	−0.0081 (−1.91)
Real price of cigarettes, cents per pack	−0.0010 (−5.09)	−0.0010 (−5.06)	−0.0010 (−2.70)
Clean indoor air index	−0.0036 (−13.43)	−0.0034 (−11.49)	−0.0012 (−2.53)
Youth access index	−0.0023 (−5.38)	−0.0018 (−3.93)	0.0020 (2.97)
Purchase use possession index	−0.0070 (−2.82)	−0.0076 (−2.92)	0.0053 (0.97)
Tobacco-producing state	0.0240 (2.90)	…	…
Region of the United States	…	0.0656 (5.19)	…
East North Central	…	0.0377 (4.33)	…
West North Central	…	0.0394 (3.59)	…
South Atlantic	…	0.0332 (3.71)	…
East South Central	…	0.0302 (2.29)	…
West South Central	…	0.0099 (0.97)	…
Mountain	…	−0.0472 (−3.84)	…
Age, y	0.5773 (16.01)	0.5759 (15.97)	0.5811 (16.13)
Age squared, y	−0.0157 (−13.95)	−0.0157 (−13.94)	−0.0158 (−14.03)
Male	−0.0340 (−6.83)	−0.0342 (−6.88)	−0.0335 (−6.73)
Race/ethnicity			
African American	−0.8050 (−85.11)	−0.8046 (−83.92)	−0.8086 (−82.94)
Hispanic	−0.2711 (−29.72)	−0.2563 (−27.50)	−0.2295 (−23.91)
Asian American	−0.4542 (−30.18)	−0.4455 (−29.48)	−0.4266 (−27.98)
Native American	0.1482 (8.47)	0.1538 (8.79)	0.1585 (9.00)
Other race	−0.1616 (−13.83)	−0.1565 (−13.37)	−0.1503 (−12.79)
Parents' education			
Father has less than high school education	0.0971 (10.89)	0.0978 (10.98)	0.0994 (11.14)
Father has at least some college	−0.0818 (−12.98)	−0.0798 (−12.66)	−0.0765 (−12.11)
Mother has less than high school education	0.0796 (8.77)	0.0814 (8.96)	0.0875 (9.62)
Mother has at least some college	−0.0390 (−6.48)	−0.0379 (−6.29)	−0.0345 (−5.71)
Real earned income, $ per wk	0.0048 (49.72)	0.0048 (49.44)	0.0048 (49.38)
Real income other sources, $ per wk	0.0072 (45.17)	0.0072 (45.30)	0.0072 (45.23)
Grade 8	0.0019 (0.11)	−0.0018 (−0.11)	0.0083 (0.49)
Grade 10	−0.0008 (−0.08)	−0.0028 (−0.27)	0.0065 (0.63)
Year surveyed			
1991	−0.2093 (−13.43)	−0.2106 (−12.82)	−0.1122 (−4.17)
1992	−0.1638 (−10.96)	−0.1653 (−10.59)	−0.0798 (−3.20)
1993	−0.1080 (−6.86)	−0.1116 (−6.74)	−0.0307 (−1.13)
1994	−0.0515 (−3.17)	−0.0567 (−3.30)	0.0036 (0.13)
1995	0.0195 (1.19)	0.0148 (0.85)	0.0695 (2.54)
1996	0.0793 (4.84)	0.0748 (4.30)	0.1251 (4.59)
1997	0.1000 (6.29)	0.0945 (5.65)	0.1202 (4.71)
1998	0.0855 (5.84)	0.0817 (5.36)	0.0981 (4.52)
1999	0.0664 (5.51)	0.0645 (5.30)	0.0722 (5.44)

Note. All equations also include an intercept and missing value indicators for race, mother's education, father's education, and earned and unearned incomes. In addition, the state fixed effects models include dichotomous indicators for each state in the sample minus 1. Asymptotic *t* ratios are in parentheses. The critical values for the *t* ratios are 2.58 (2.33), 1.96 (1.64), and 1.64 (1.28) at the 1%, 5%, and 10% significance levels, respectively, based on a 2-tailed (1-tailed) test.

Although these estimates imply that funding for tobacco control decreased youth smoking prevalence in the 1990s, the estimates also imply that increased tobacco control funding to match the CDC guidelines would have a very substantial impact on youth smoking prevalence.

Other policies that were found to decrease smoking by youth included higher cigarette prices and stronger restrictions on youth access to tobacco; smoke-free air laws; and purchase, use, and possession laws.

DISCUSSION

Comprehensive state-level programs to reduce tobacco use have become a major focus of tobacco control efforts since the creation of the California tobacco control program in 1989. In fiscal year 2002, nearly $900 million was invested in state-level tobacco control programs by the federal government, the states, private foundations, and other organizations. Per capita funding for these programs remains well below the CDC-recommended minimum level for a comprehensive program in the vast majority of states and is only a small fraction of what the tobacco industry spends on marketing.

In fiscal year 2003, states are projected to collect a record amount of tobacco-generated revenue.[29] Unfortunately, states are expected to cut funding for tobacco control programs by more than $86 million because of significant state-level budget shortfalls.[29] The findings from this study should be of particular interest to policymakers debating the use of tobacco-generated revenue. This study provides clear evidence that tobacco control funding is inversely related to the percentage of youths who smoke and the average number of cigarettes smoked by young smokers. A substantial decrease in funding could lead to substantial increases in adolescent smoking, not dissimilar to what was observed in the 1990s.

A limitation of this study is that no information is available on the type of interventions each state program uses and the percentage of funding that is spent on each intervention. A second limitation of the

TABLE 3—Equations for Average Smoking by Smokers

Independent Variables	Model 1	Model 2	Model 3
Real per capita tobacco control expenditures, $ per y	−0.0339 (−7.85)	−0.0549 (−11.12)	−0.0359 (−4.27)
Real price of cigarettes, cents per y	0.0001 (0.14)	−0.0002 (−0.52)	−0.0015 (−2.10)
Clean indoor air index	−0.0025 (−4.76)	−0.0032 (−5.39)	−0.0026 (−2.85)
Youth access index	−0.0068 (−8.36)	−0.0058 (−6.44)	−0.0035 (−2.62)
Purchase use possession index	−0.0154 (−3.21)	−0.0155 (−3.08)	0.0114 (1.07)
Tobacco-producing state	0.0766 (4.73)	…	…
Region			
New England	…	0.1893 (7.45)	…
East North Central	…	0.0297 (1.76)	…
West North Central	…	−0.0062 (−0.29)	…
South Atlantic	…	0.0580 (3.31)	…
East South Central	…	0.0902 (3.47)	…
West South Central	…	−0.1424 (−7.23)	…
Mountain	…	−0.0967 (−4.05)	…
Age, y	0.4313 (5.88)	0.4308 (5.89)	0.4335 (5.96)
Age squared, y	−0.0092 (−4.01)	−0.0091 (−4.00)	−0.0091 (−4.03)
Male	0.0358 (3.63)	0.0359 (3.65)	0.0387 (3.94)
Race/ethnicity			
African American	−0.7654 (−37.78)	−0.7625 (−37.47)	−0.7605 (−36.87)
Hispanic	−0.5831 (−33.45)	−0.5303 (−29.60)	−0.4837 (−26.28)
Asian American	−0.2358 (−6.91)	−0.2188 (−6.40)	−0.1827 (−5.31)
Native American	0.0849 (2.60)	0.0996 (3.07)	0.1116 (3.43)
Other race	−0.0673 (−2.76)	−0.0633 (−2.60)	−0.0537 (−2.20)
Parents' education			
Father has less than high school education	0.1629 (9.77)	0.1661 (9.98)	0.1669 (10.04)
Father has at least some college	−0.1806 (−14.83)	−0.1747 (−14.33)	−0.1707 (−14.00)
Mother has less than high school education	0.1311 (7.71)	0.1387 (8.17)	0.1416 (8.35)
Mother has at least some college	−0.1059 (−9.11)	−0.1021 (−8.78)	−0.0988 (−8.51)
Real earned income, $ per wk	0.0052 (27.61)	0.0051 (27.35)	0.0051 (27.28)
Real income from other sources, $ per wk	0.0071 (23.11)	0.0072 (23.46)	0.0072 (23.41)
Grade 8	0.0925 (2.78)	0.0961 (2.90)	0.1025 (3.07)
Grade 10	0.0902 (4.52)	0.0880 (4.41)	0.0842 (4.16)
Year surveyed			
1991	−0.0502 (−1.61)	−0.0771 (−2.37)	−0.0852 (−1.59)
1992	−0.1206 (−4.08)	−0.1441 (−4.70)	−0.1568 (−3.18)
1993	−0.0627 (−2.03)	−0.0947 (−2.93)	−0.1170 (−2.17)
1994	−0.0526 (−1.65)	−0.0839 (−2.49)	−0.1238 (−2.24)
1995	−0.0214 (−0.67)	−0.0429 (−1.29)	−0.0833 (−1.54)
1996	0.0454 (1.43)	0.0218 (0.65)	−0.0223 (−0.42)
1997	0.0543 (1.77)	0.0297 (0.92)	−0.0230 (−0.46)
1998	−0.0061 (−0.22)	−0.0252 (−0.86)	−0.0803 (−1.88)
1999	0.0522 (2.19)	0.0425 (1.77)	0.0226 (0.86)

Note. All equations also include an intercept and missing value indicators for race, mother's education, father's education, and earned and unearned incomes. In addition, the state fixed effects models include dichotomous indicators for each state in the sample minus 1. Asymptotic *t* ratios are in parentheses. The critical values for the *t* ratios are 2.58 (2.33), 1.96 (1.64), and 1.64 (1.28) at the 1%, 5%, and 10% significance levels, respectively, based on a 2-tailed (1-tailed) test.

study is that cross-sectional data are used, and causality cannot be established with certainty. ■

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Human Participant Protection

This study received an exemption from review by the human subjects committee of the University of Illinois at Chicago.

TABLE 4—Predicted Prevalence of Smoking, Percentage Point Changes, and Percentage Changes

	Tobacco-Producing State Indicator	US Census Division Indicators	State Fixed Effects
Predicted prevalence of smoking			
Predicted prevalence: no state-level spending	24.68	24.72	24.37
Mean predicted prevalence	24.22	24.22	24.26
Predicted prevalence at CDC minimum recommendation	21.16	20.95	23.46
Predicted prevalence at CDC maximum recommendation	16.02	15.5	21.98
Percentage point changes in predicted prevalence			
From no funding to mean	-0.46	-0.50	-0.11
From no funding to CDC minimum	-3.52	-3.77	-0.91
From no funding to CDC maximum	-8.66	-9.22	-2.39
From mean to CDC minimum	-3.06	-3.27	-0.80z
From mean to CDC maximum	-8.2	-8.72	-2.28
Percentage changes in predicted prevalence			
From no funding to mean	-1.86	-2.02	-0.45
From no funding to CDC minimum	-14.26	-15.25	-3.73
From no funding to CDC maximum	-35.09	-37.30	-9.81
From mean to CDC minimum	-12.63	-13.50	-3.30
From mean to CDC maximum	-33.86	-36.00	-9.40

Note. CDC = Centers for Disease Control and Prevention.
In 1999, as part of its *Best Practices* guidelines, the Centers for Disease Control and Prevention recommended a per capita minimum and maximum amount of money to spend on tobacco control for each state. The state-specific recommended funding levels for 1991–2000 that were used in the simulations were inflation-adjusted values of the CDC's 1999 recommendations using the Consumer Price Index published by the Bureau of Labor Statistics (1982–1984 = 100).

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